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FROM: Joseph W. Price PHONE: 714-427-7420

MESSAGE:

RE: Serial No. 10/580,933
Attorney Docket: 52534-7800

Please see attached Letter and Partial English Translation.

ORIGINAL DOCUMENT:	Will not be sent	NUMBER OF PAGES (Including Cover):	10
CONFIRMATION NO.:		CLIENT MATTER NO.:	99999-0000
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Patent
52534-7800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Patent Examiner: Devito, Alex T.
Eisuke Chiba	Group Art Unit: 2856
Serial No.: 10/580,933	Confirmation No.: 9242
Filed: May 30, 2006	
For: MOISTURE ABSORBENT MATERIAL WITH INDICATOR FUNCTION, HUMIDITY INDICATOR AND PACKAGING BAG	February 1, 2010 Costa Mesa, California 92626

LETTER

VIA FACSIMILE
571-270-8551

ATTN: EXAMINER ALEX. T. DEVITO

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Examiner Devito:

In accordance with your request, enclosed is a partial English translation of the Japanese Laid Open Patent Application No. 2002-206046, Pages 1-8.

If you have any questions, please let me know.

Very truly yours,

SNELL & WILMER L.L.P.

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(Partial Translation of Japanese Patent Application
Laid-Open Publication No. 2002-206046)

(54) [Title of the Invention] Desiccant-Containing Film and Method for Manufacturing the Same

(57) [Abstract]

[Problem to be Solved] To provide a desiccant-containing film useful as a packaging material having hygroscopicity by itself and provide a method for manufacturing the film.

[Means for Solving Problem] The desiccant-containing film 6 is manufactured by kneading a resin with a powdered molecular sieve 8.

[Claims]

[Claim 1] A desiccant-containing film characterized by a resin kneaded with a powdered desiccant.

[Claim 2] The desiccant-containing film according to claim 1, wherein the content of said desiccant is not less than 1% and not more than 50% of a mixture of said resin and said desiccant in terms of weight.

[Claim 3] The desiccant-containing film according to claim 1 or 2, wherein said desiccant comprises a molecular sieve and a diameter of fine pores of said molecular sieve is 3 Å or 4 Å.

[Claim 4] The desiccant-containing film according to claim 1, 2 or 3, wherein a gas-barrier film is laminated on said desiccant-containing film.

[Claim 5] A method of manufacturing a desiccant-containing film, characterized in that the method comprises: feeding a particulate resin material having a powdered desiccant mixed therein into an extruder, and extruding said particulate resin material as a molten resin material at an extrusion temperature of 240°C or less.

[Claim 6] The method of manufacturing a desiccant-containing film according to claim 5, wherein the content of said desiccant is not less than 1% and not more than 50% of said particulate resin material in terms of weight.

[Claim 7] The method of manufacturing a desiccant-containing film according to claim 5 or 6, wherein said desiccant comprises a molecular sieve and a diameter of fine pores of said molecular sieve is 3 Å or 4 Å.

[Claim 8] The method of manufacturing a desiccant-containing film according to claim 5, 6 or 7, wherein said particulate resin material contains at least one kind of resin that has an MFR of 10 or more.

[Detailed Description of the Invention]

[0001]

[Field to which the Invention Pertains]

This invention relates to a desiccant-containing film which has hygroscopicity and can be used as a packaging material, and a method for manufacturing the same.

[0002]

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[0011]

[Mode for Carrying Out the Invention]

Hereinafter, embodiments of the present invention will be described with reference to the drawings. Figs. 1 (a) and 1(b) are sectional views showing an embodiment of a desiccant-containing film according to the present invention. A desiccant-containing film 6 of this embodiment includes a resin film 7 having a desiccant 8 dispersed therein, as shown in Fig. 1 (a). As the desiccant, silica gel, activated alumina, or a molecular sieve can be used, and especially a molecular sieve is preferred. A molecular sieve is a typical synthetic zeolite that is a porous granular substance that is used for separating substances depending on a size of a molecule and has a structure with uniform fine pores, so that the molecular sieve absorbs small molecules that can enter cavities of the fine pores to act as a kind of sieve. Molecular sieves having pore diameters of 3 Å, 4 Å, 5 Å and 10 Å are known, and these molecular sieves are usually called molecular sieve 3A, molecular sieve 4A, molecular sieve 5A, and molecular sieve 13X, respectively. In this embodiment, molecular sieve 3A or molecular sieve 4A is preferably used as a desiccant. The molecular sieve having an average particle diameter of, for example, about 10 μm is used.

[0012]

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[0013]

The hygroscopicity or moisture absorption of a molecular sieve depends on the diameter of fine pores. The moisture absorption characteristics of the molecular sieve can be enhanced by making the molecular sieve powder finer to make the surface area thereof substantially large and increase the number of fine pores. In this instance, the average particle diameter of the molecular sieve is preferably set to be not more than about 20 μm and not less than about 5 μm. The content of the molecular sieve is not less than 1% and not more than 50 % of the sum of a resin material (base resin) for the resin film 7 and the molecular sieve in terms of weight.

[0014]

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[0016]

The desiccant-containing film shown in Fig. 1 (b) is formed by extrusion coating of the resin film 7 of Fig. 1 (a), having the molecular sieve 8 dispersed, on a base film 10. The base film 10 is a film for packaging and is preferably formed of a gas barrier film, for example, an aluminum laminate film, an aluminum-evaporated film, an inorganic substance-evaporated film, a K-coated film (a film having vinylidene chloride-vinyl chloride copolymer latex applied thereto), an OPP film (a biaxially oriented polypropylene film), an OPE film (an oriented polyethylene film) or the like. The resin film 7 and the base film 10 can be joined by thermal bonding. Of course it is obvious that a solvent or adhesive may be used for joining these films.

[0017]

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[0019]

The particulate resin is formed of the abovementioned resin material that has the molecular sieve 8 kneaded therewith and dispersed therein and that is cut into suitable lengths, which are usually called chips or pellets. As explained above, the molecular sieve 8 is a powdered inorganic porous substance which has fine pores of a diameter of 4 Å or 5 Å, and the content of the molecular sieve contained in the particulate resin is set to be not more than 50% and not less than 1 % of the total weight of the resin and the molecular sieve. The desiccant-containing film can be provided with a predetermined moisture absorption performance as a desired water absorption capacity on the basis of the weight ratio.

[0020]

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[0023]

The content of the molecular sieve corresponding to the MFR value is estimated such that the content of the molecular sieve is preferably 12% by weight for a base resin having MFR of 10, 25% by weight for a base resin having MFR of 20, and 35% by weight for a base resin having MFR of 30. Therefore, when the amount of moisture absorption per unit area of the desiccant-containing sheet is increased, a resin having a high MFR value is suitable, and such a resin having MFR of, for example, 30 or more is preferred.

[0024]

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[0036]

On the other hand, it is indispensable that the particulate resin fed into an extruder have such an MFR as to permit extrusion thereof by the extruder, while the MFR of the resin decreases by mixing a powdered molecular sieve therein, and therefore it is important that the base resin mixed with the molecular sieve have a high MFR. Although the content of a molecular sieve is dependent on the MFR of a base resin, the molecular sieve can be mixed with from 1 to 50% of the weight of the mixture of resin and the molecular sieve in general. The content of the molecular sieve is most preferably 8 to 40 % by weight in a mixed state in view of processability.

[0037]

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[0039]

[Table 2]

Sample	Molecular sieve	Resin	MFR of resin	Extrusion temperature	Dry content	Suitability for extrusion
5	3A	EMAA	32	200°C	30 wt%	Film formed
6	3A	EMAA	32	200°C	40 wt%	Film formed

[0040]

Next, the confirmatory experiments on the moisture absorption performance of examples of the desiccant-containing film according to the present invention were conducted. In experiment 1, the examination was done in an environment at room temperature and at a relative humidity of 65% (20°C, 65%RH). Samples were each prepared in such a manner that a packaging sheet having a gas-barrier film coated with a desiccant-containing sheet was formed and then formed into a bag, and a commercially available soup stock cube was put in this bag and the bag was then sealed. The packaging sheet of each sample used is one that includes a PET film of 12 μm thickness with an aluminum deposited layer of 600 Å thickness on one side thereof and that has a desiccant-containing film formed of a resin mixed with a molecular sieve laminated on a surface of the aluminum deposited layer (PET/AL/desiccant-containing film). The sample 6 in the abovementioned example was used for the desiccant-containing film.

[0041]

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[0045]

In the desiccant-containing film of this invention, the molecular sieve mixed in the

resin film absorbs moisture and changes from being whitish turbid into being transparent. Therefore, if this film does not use another colorant or the like, the desiccant-containing film can be used as an indicator which indicates that the limit of moisture absorption performance thereof is reached at the time the film changes from being whitish turbid into being transparent.

[0046]

[Effect of the Invention]

As described above, according to the present invention, it is confirmed that a base resin is kneaded with a powdered molecular sieve and the molecular sieve kneaded resin is extruded by the extruder into a film-like sheet, so that a desiccant-containing film which has the molecular sieve dispersed uniformly therein is producible. This desiccant-containing film is a film which can be used as a packaging material and which itself has characteristics that offer a moisture absorption performance. Therefore, a bag formed of this desiccant-containing film has an advantage that a small desiccant containing bag does not need to be enclosed therein.

[0047]

In addition, according to the present invention, there is an advantage that a desiccant-containing film can be provided with a sufficient strength as a packaging material by coating the desiccant-containing film with a gas-barrier film. Furthermore, the desiccant-containing film coated with the gas-barrier film is excellent in design and can be used as a packaging material which wraps a dry article or articles with no need of enclosing therein a small desiccant containing bag that has been conventionally enclosed in, for example, a confectionery bag, leading to laborsaving in a packaging process, and an advantage that there is no possibility of a desiccant being mixed in foodstuffs accidentally or the desiccant being ingested by mistake, so that a desiccant-containing film as a packaging material which is very safe can be provided.

[0048]

...

[Brief Description of the Drawings]

[Fig. 1] Figs. 1(a) and 1(b) are sectional views showing an embodiment of a desiccant-containing film according to the present invention.

[Fig. 2] Fig. 2 is an explanatory view showing an extruder for manufacturing the desiccant-containing film of the embodiment.

[Fig. 3] Fig. 3 is an explanatory view showing another example of the extruder for

manufacturing the desiccant-containing film of the embodiment.

[Fig. 4] Fig. 4 is an explanatory view showing a yet another example of the extruder for manufacturing the desiccant-containing film of the embodiment.

[Fig. 5] Fig. 5 is a graph showing moisture absorption characteristics of molecular sieves 3A and 5A.

[Fig. 6] Fig. 6(a) is a top view showing a bag used in an experiment and Fig. 6(b) is a graph showing the experimental result.

[Fig. 7] Fig. 7 is a sectional view showing an example of a conventional packaging material using a desiccant.

[Description of Reference Numerals]

6 Desiccant-containing sheet part

7 Resin film

8 Molecular sieve

9 Jointing

10 Base film

11 Extruder

12 Driving section

13 Screw

14 Cylinder

15 Heater

16 Thermometer

17 Hopper

18 T die

19 Cooling roller

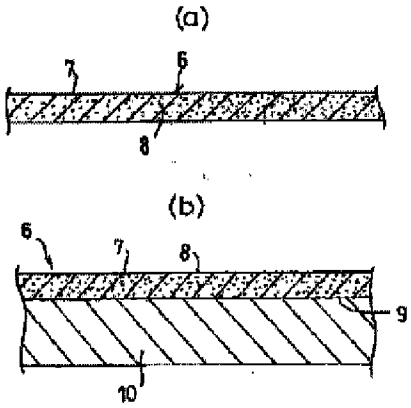
20 Winding device

21 Supplying device

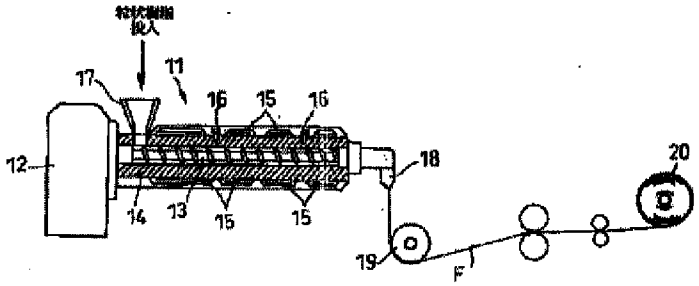
22 Solvent applying pan

23 Dryer

[Fig. 1]

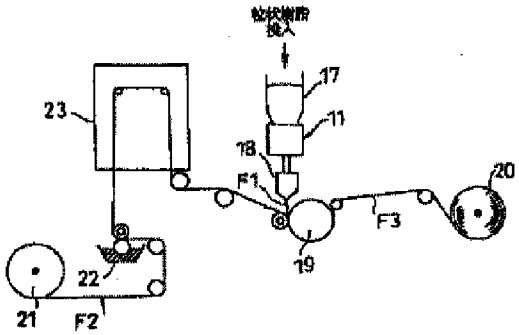


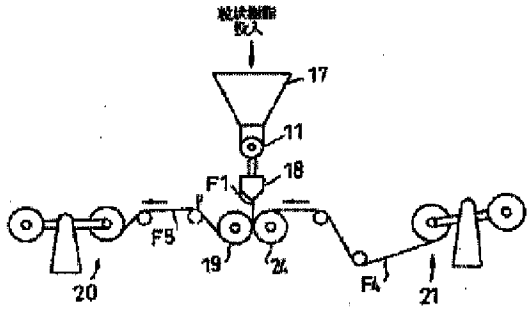
[Fig. 2]



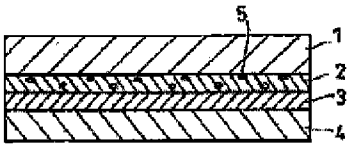
[Fig. 4]

[Fig. 3]

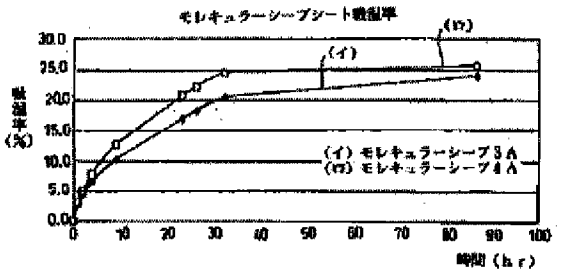




[Fig. 7]



[Fig. 5]



[Fig. 6]